

## SEQUENCE LISTING

<110> USUDA, Yoshihiro  
KURAHASHI, Osamu

## <120> Method for Producing L-Methionine by Fermentation

<130> OP914

<140>

<141> 1999-11-

<150> JP 10-326717

<151> 1998-11-17

<160> 29

<170> PatentIn Ver. 2.0

<210> 1

<211> 28

<212> DNA

### <213> Artificial Sequence

**<220>**

<223> Description of Artificial Sequence: primer

<400> 1

gggaattctg gcaggaggaa ctggcgca

28

<210> 2

<211> 28

## <212> DNA

### <213> Artificial Sequence

**<220>**

<223> Description of Artificial Sequence:primer

**<400> 2**

[illegible]

sub  
c'

28

<213> Artificial Sequence

<223> Description of Artificial Sequence:primer

28

### <213> Artificial Sequence

<223> Description of Artificial Sequence:primer

28

### <213> Artificial Sequence

<223> Description of Artificial Sequence:primer

28

### <213> Artificial Sequence

**<220>**

<223> Description of Artificial Sequence:primer

<400> 6

gggaattctc atggttgcgg cgtgagag

28

<210> 7

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 7

ggaagcttgc gtgagatggg gattaacc

28

<210> 8

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 8

gggaattcta ctgctagctg ctcttgcg

28

<210> 9

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 9

ggaagcttaa aattttattg acttaggtca ctaaatactt taaccaatat aggcatacg 60  
cacagacgca tgccc 75

<210> 10

<211> 75

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 10

gggcatgcgt ctgtgcgcta tgcctatatt ggttaaagta tttagtgacc taagtcaata 60  
aaattttaag cttcc 75

<210> 11

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 11

caacagtttg agctaacc 18

<210> 12

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 12

gcggtttttt tgccggatgc 20

<210> 13

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 13

tcggctacgc aactaatg

18

<210> 14

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 14

gagaatgcac cgccaccg

18

<210> 15

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 15

tggcgcgtca cggtggcg

18

<210> 16

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 16

gcacgtcggt ttcattag

18

<210> 17

<211> 1155

<212> DNA

<213> Escherichia coli

<220>

&lt;221&gt; CDS

&lt;222&gt; (1)..(1152)

&lt;400&gt; 17

atg gca aaa cac ctt ttt acg tcc gag tcc gtc tct gaa ggg cat cct	48
Met Ala Lys His Leu Phe Thr Ser Glu Ser Val Ser Glu Gly His Pro	
1 5 10 15	
gac aaa att gct gac caa att tct gat gcc gtt tta gac gcg atc ctc	96
Asp Lys Ile Ala Asp Gln Ile Ser Asp Ala Val Leu Asp Ala Ile Leu	
20 25 30	
gaa cag gat ccg aaa gca cgc gtt gct tgc gaa acc tac gta aaa acc	144
Glu Gln Asp Pro Lys Ala Arg Val Ala Cys Glu Thr Tyr Val Lys Thr	
35 40 45	
ggc atg gtt tta gtt ggc ggc gaa atc acc acc agc gcc tgg gta gac	192
Gly Met Val Leu Val Gly Gly Glu Ile Thr Thr Ser Ala Trp Val Asp	
50 55 60	
atc gaa gag atc acc cgt aac acc gtt cgc gaa att ggc tat gtg cat	240
Ile Glu Glu Ile Thr Arg Asn Thr Val Arg Glu Ile Gly Tyr Val His	
65 70 75 80	
tcc gac atg ggc ttt gac gct aac tcc tgt gcg gtt ctg agc gct atc	288
Ser Asp Met Gly Phe Asp Ala Asn Ser Cys Ala Val Leu Ser Ala Ile	
85 90 95	
ggc aaa cag tct cct gac atc aac cag ggc gtt gac cgt gcc gat ccg	336
Gly Lys Gln Ser Pro Asp Ile Asn Gln Gly Val Asp Arg Ala Asp Pro	
100 105 110	
ctg gaa cag ggc gcg ggt gac cag ggt ctg atg ttt ggc tac gca act	384
Leu Glu Gln Gly Ala Gly Asp Gln Gly Leu Met Phe Gly Tyr Ala Thr	
115 120 125	
aat gaa acc gac gtg ctg atg cca gca cct atc acc tat gca cac cgt	432
Asn Glu Thr Asp Val Leu Met Pro Ala Pro Ile Thr Tyr Ala His Arg	
130 135 140	
ctg gta cag cgt cag gct gaa gtg cgt aaa aac ggc act ctg ccg tgg	480
Leu Val Gln Arg Gln Ala Glu Val Arg Lys Asn Gly Thr Leu Pro Trp	
145 150 155 160	
ctg cgc ccg gac gcg aaa agc cag gtg act ttt cag tat gac gac ggc	528
Leu Arg Pro Asp Ala Lys Ser Gln Val Thr Phe Gln Tyr Asp Asp Gly	
165 170 175	
aaa atc gtt ggt atc gat gct gtc gtg ctt tcc act cag cac tct gaa	576
Lys Ile Val Gly Ile Asp Ala Val Val Leu Ser Thr Gln His Ser Glu	
180 185 190	
gag atc gac cag aaa tcg ctg caa gaa gcg gta atg gaa gag atc atc	624

Glu Ile Asp Gln Lys Ser Leu Gln Glu Ala Val Met Glu Glu Ile Ile	
195	200
aag cca att ctg ccc gct gaa tgg ctg act tct gcc acc aaa ttc ttc	672
Lys Pro Ile Leu Pro Ala Glu Trp Leu Thr Ser Ala Thr Lys Phe Phe	
210	215
atc aac ccg acc ggt cgt ttc gtt atc ggt ggc cca atg ggt gac tgc	720
Ile Asn Pro Thr Gly Arg Phe Val Ile Gly Gly Pro Met Gly Asp Cys	
225	230
ggt ctg act ggt cgt aaa att atc gtt gat acc tac ggc ggc atg gcg	768
Gly Leu Thr Gly Arg Lys Ile Ile Val Asp Thr Tyr Gly Gly Met Ala	
245	250
cgt cac ggt ggc ggt gca ttc tct ggt aaa gat cca tca aaa gtg gac	816
Arg His Gly Gly Gly Ala Phe Ser Gly Lys Asp Pro Ser Lys Val Asp	
260	265
cgt tcc gca gcc tac gca gca cgt tat gtc gcg aaa aac atc gtt gct	864
Arg Ser Ala Ala Tyr Ala Ala Arg Tyr Val Ala Lys Asn Ile Val Ala	
275	280
gct ggc ctg gcc gat cgt tgt gaa att cag gtt tcc tac gca atc ggc	912
Ala Gly Leu Ala Asp Arg Cys Glu Ile Gln Val Ser Tyr Ala Ile Gly	
290	295
gtg gct gaa ccg acc tcc atc atg gta gaa act ttc ggt act gag aaa	960
Val Ala Glu Pro Thr Ser Ile Met Val Glu Thr Phe Gly Thr Glu Lys	
305	310
gtg cct tct gaa caa ctg acc ctg ctg gta cgt gag ttc ttc gac ctg	1008
Val Pro Ser Glu Gln Leu Thr Leu Leu Val Arg Glu Phe Phe Asp Leu	
325	330
cgc cca tac ggt ctg att cag atg ctg gat ctg ctg cac ccg atc tac	1056
Arg Pro Tyr Gly Leu Ile Gln Met Leu Asp Leu Leu His Pro Ile Tyr	
340	345
aaa gaa acc gca gca tac ggt cac ttt ggt cgt gaa cat ttc ccg tgg	1104
Lys Glu Thr Ala Ala Tyr Gly His Phe Gly Arg Glu His Phe Pro Trp	
355	360
gaa aaa acc gac aaa gcg cag ctg ctg cgc gat gct gcc ggt ctg aag	1152
Glu Lys Thr Asp Lys Ala Gln Leu Leu Arg Asp Ala Ala Gly Leu Lys	
370	375
taa	1155

&lt;210&gt; 18

&lt;211&gt; 384

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 18

Met	Ala	Lys	His	Leu	Phe	Thr	Ser	Glu	Ser	Val	Ser	Glu	Gly	His	Pro
1				5					10					15	
Asp	Lys	Ile	Ala	Asp	Gln	Ile	Ser	Asp	Ala	Val	Leu	Asp	Ala	Ile	Leu
			20					25					30		
Glu	Gln	Asp	Pro	Lys	Ala	Arg	Val	Ala	Cys	Glu	Thr	Tyr	Val	Lys	Thr
		35					40					45			
Gly	Met	Val	Leu	Val	Gly	Gly	Glu	Ile	Thr	Thr	Ser	Ala	Trp	Val	Asp
	50					55					60				
Ile	Glu	Glu	Ile	Thr	Arg	Asn	Thr	Val	Arg	Glu	Ile	Gly	Tyr	Val	His
65					70					75					80
Ser	Asp	Met	Gly	Phe	Asp	Ala	Asn	Ser	Cys	Ala	Val	Leu	Ser	Ala	Ile
				85					90					95	
Gly	Lys	Gln	Ser	Pro	Asp	Ile	Asn	Gln	Gly	Val	Asp	Arg	Ala	Asp	Pro
			100				105						110		
Leu	Glu	Gln	Gly	Ala	Gly	Asp	Gln	Gly	Leu	Met	Phe	Gly	Tyr	Ala	Thr
		115				120							125		
Asn	Glu	Thr	Asp	Val	Leu	Met	Pro	Ala	Pro	Ile	Thr	Tyr	Ala	His	Arg
	130					135					140				
Leu	Val	Gln	Arg	Gln	Ala	Glu	Val	Arg	Lys	Asn	Gly	Thr	Leu	Pro	Trp
145				150						155					160
Leu	Arg	Pro	Asp	Ala	Lys	Ser	Gln	Val	Thr	Phe	Gln	Tyr	Asp	Asp	Gly
			165						170					175	
Lys	Ile	Val	Gly	Ile	Asp	Ala	Val	Val	Leu	Ser	Thr	Gln	His	Ser	Glu
		180						185					190		
Glu	Ile	Asp	Gln	Lys	Ser	Leu	Gln	Glu	Ala	Val	Met	Glu	Glu	Ile	Ile
	195						200					205			
Lys	Pro	Ile	Leu	Pro	Ala	Glu	Trp	Leu	Thr	Ser	Ala	Thr	Lys	Phe	Phe
	210					215					220				
Ile	Asn	Pro	Thr	Gly	Arg	Phe	Val	Ile	Gly	Gly	Pro	Met	Gly	Asp	Cys
225				230						235				240	
Gly	Leu	Thr	Gly	Arg	Lys	Ile	Ile	Val	Asp	Thr	Tyr	Gly	Gly	Met	Ala
			245						250					255	
Arg	His	Gly	Gly	Gly	Ala	Phe	Ser	Gly	Lys	Asp	Pro	Ser	Lys	Val	Asp
		260						265					270		
Arg	Ser	Ala	Ala	Tyr	Ala	Ala	Arg	Tyr	Val	Ala	Lys	Asn	Ile	Val	Ala
	275					280						285			
Ala	Gly	Leu	Ala	Asp	Arg	Cys	Glu	Ile	Gln	Val	Ser	Tyr	Ala	Ile	Gly
	290					295					300				
Val	Ala	Glu	Pro	Thr	Ser	Ile	Met	Val	Glu	Thr	Phe	Gly	Thr	Glu	Lys

305                      310                      315                      320  
 Val Pro Ser Glu Gln Leu Thr Leu Leu Val Arg Glu Phe Phe Asp Leu  
                          325                      330                      335  
 Arg Pro Tyr Gly Leu Ile Gln Met Leu Asp Leu Leu His Pro Ile Tyr  
                          340                      345                      350  
 Lys Glu Thr Ala Ala Tyr Gly His Phe Gly Arg Glu His Phe Pro Trp  
                          355                      360                      365  
 Glu Lys Thr Asp Lys Ala Gln Leu Leu Arg Asp Ala Ala Gly Leu Lys  
                          370                      375                      380

<210> 19

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 19

ggaagcttaa gcagagatgc agagtgcg

28

<210> 20

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 20

ggaagcttgg tgcggtataa gaggccac

28

<210> 21

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 21

gggcatgctg tagtgaggta atcaggtt

28

<210> 22

<211> 28

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 22

gggtcgactt aatccagcgt tggattca

28

<210> 23

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 23

tgtctgctgg gcggtaca

18

<210> 24

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence:primer

<400> 24

agagagtttt tcggtgcg

18

<210> 25

<211> 930

<212> DNA

<213> Escherichia coli

<220>

&lt;221&gt; ODS

&lt;222&gt; (1)..(927)

&lt;400&gt; 25

atg ccg att cgt gtg ccg gac gag cta ccc gcc gtc aat ttc ttg cgt	48
Met Pro Ile Arg Val Pro Asp Glu Leu Pro Ala Val Asn Phe Leu Arg	
1 5 10 15	
gaa gaa aac gtc ttt gtg atg aca act tct cgt gcg tct ggt cag gaa	96
Glu Glu Asn Val Phe Val Met Thr Thr Ser Arg Ala Ser Gly Gln Glu	
20 25 30	
att cgt cca ctt aag gtt ctg atc ctt aac ctg atg ccg aag aag att	144
Ile Arg Pro Leu Lys Val Leu Ile Leu Asn Leu Met Pro Lys Lys Ile	
35 40 45	
gaa act gaa aat cag ttt ctg cgc ctg ctt tca aac tca cct ttg cag	192
Glu Thr Glu Asn Gln Phe Leu Arg Leu Leu Ser Asn Ser Pro Leu Gln	
50 55 60	
gtc gat att cag ctg ttg ggc atc gat tcc cgt gaa tcg cgc aac acg	240
Val Asp Ile Gln Leu Leu Arg Ile Asp Ser Arg Glu Ser Arg Asn Thr	
65 70 75 80	
ccc gca gag cat ctg aac aac ttc tac tgt aac ttt gaa gat att cag	288
Pro Ala Glu His Leu Asn Asn Phe Tyr Cys Asn Phe Glu Asp Ile Gln	
85 90 95	
gat cag aac ttt gac ggt ttg att gta act ggt gcg ccg ctg ggc ctg	336
Asp Gln Asn Phe Asp Gly Leu Ile Val Thr Gly Ala Pro Leu Gly Leu	
100 105 110	
gtg gag ttt aat gat gtc gct tac tgg ccg cag atc aaa cag gtg ctg	384
Val Glu Phe Asn Asp Val Ala Tyr Trp Pro Gln Ile Lys Gln Val Leu	
115 120 125	
gag tgg tcg aaa gat cac gtc acc tcg acg ctg ttt gtc tgc tgg gcg	432
Glu Trp Ser Lys Asp His Val Thr Ser Thr Leu Phe Val Cys Trp Ala	
130 135 140	
gta cag gcc gcg ctc aat atc ctc tac ggc att cct aag caa act cgc	480
Val Gln Ala Ala Leu Asn Ile Leu Tyr Gly Ile Pro Lys Gln Thr Arg	
145 150 155 160	
acc gaa aaa ctc tct ggc gtt tac gag cat cat att ctc cat cct cat	528
Thr Glu Lys Leu Ser Gly Val Tyr Glu His His Ile Leu His Pro His	
165 170 175	
gcg ctt ctg acg cgt ggc ttt gat gat tca ttc ctg gca ccg cat tcg	576
Ala Leu Leu Thr Arg Gly Phe Asp Asp Ser Phe Leu Ala Pro His Ser	
180 185 190	
cgc tat gct gac ttt ccg gca gcg ttg att cgt gat tac acc gat ctg	624

Arg Tyr Ala Asp Phe Pro Ala Ala Leu Ile Arg Asp Tyr Thr Asp Leu  
 -- 195 200 205  
 gaa att ctg gca gag acg gaa gaa ggg gat gca tat ctg ttt gcc agt 672  
 Glu Ile Leu Ala Glu Thr Glu Glu Gly Asp Ala Tyr Leu Phe Ala Ser  
 210 215 220  
 aaa gat aag cgc att gcc ttt gtg acg ggc cat ccc gaa tat gat gcg 720  
 Lys Asp Lys Arg Ile Ala Phe Val Thr Gly His Pro Glu Tyr Asp Ala  
 225 230 235 240  
 caa acg ctg gcg cag gaa ttt ttc cgc gat gtg gaa gcc gga cta gac 768  
 Gln Thr Leu Ala Gln Glu Phe Phe Arg Asp Val Glu Ala Gly Leu Asp  
 245 250 255  
 ccg gat gta ccg tat aac tat ttc ccg cac aat gat ccg caa aat aca 816  
 Pro Asp Val Pro Tyr Asn Tyr Phe Pro His Asn Asp Pro Gln Asn Thr  
 260 265 270  
 ccg cga gcg agc tgg cgt agt cac ggt aat tta ctg ttt acc aac tgg 864  
 Pro Arg Ala Ser Trp Arg Ser His Gly Asn Leu Leu Phe Thr Asn Trp  
 275 280 285  
 ctc aac tat tac gtc tac cag atc acg cca tac gat cta cgg cac atg 912  
 Leu Asn Tyr Tyr Val Tyr Gln Ile Thr Pro Tyr Asp Leu Arg His Met  
 290 295 300  
 aat cca acg ctg gat taa 930  
 Asn Pro Thr Leu Asp  
 305

&lt;210&gt; 26

&lt;211&gt; 309

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 26

Met Pro Ile Arg Val Pro Asp Glu Leu Pro Ala Val Asn Phe Leu Arg  
 1 5 10 15  
 Glu Glu Asn Val Phe Val Met Thr Thr Ser Arg Ala Ser Gly Gln Glu  
 20 25 30  
 Ile Arg Pro Leu Lys Val Leu Ile Leu Asn Leu Met Pro Lys Lys Ile  
 35 40 45  
 Glu Thr Glu Asn Gln Phe Leu Arg Leu Leu Ser Asn Ser Pro Leu Gln  
 50 55 60  
 Val Asp Ile Gln Leu Leu Arg Ile Asp Ser Arg Glu Ser Arg Asn Thr  
 65 70 75 80  
 Pro Ala Glu His Leu Asn Asn Phe Tyr Cys Asn Phe Glu Asp Ile Gln

85 90 95  
 Asp Gln Asn Phe Asp Gly Leu Ile Val Thr Gly Ala Pro Leu Gly Leu  
 100 105 110  
 Val Glu Phe Asn Asp Val Ala Tyr Trp Pro Gln Ile Lys Gln Val Leu  
 115 120 125  
 Glu Trp Ser Lys Asp His Val Thr Ser Thr Leu Phe Val Cys Trp Ala  
 130 135 140  
 Val Gln Ala Ala Leu Asn Ile Leu Tyr Gly Ile Pro Lys Gln Thr Arg  
 145 150 155 160  
 Thr Glu Lys Leu Ser Gly Val Tyr Glu His His Ile Leu His Pro His  
 165 170 175  
 Ala Leu Leu Thr Arg Gly Phe Asp Asp Ser Phe Leu Ala Pro His Ser  
 180 185 190  
 Arg Tyr Ala Asp Phe Pro Ala Ala Leu Ile Arg Asp Tyr Thr Asp Leu  
 195 200 205  
 Glu Ile Leu Ala Glu Thr Glu Glu Gly Asp Ala Tyr Leu Phe Ala Ser  
 210 215 220  
 Lys Asp Lys Arg Ile Ala Phe Val Thr Gly His Pro Glu Tyr Asp Ala  
 225 230 235 240  
 Gln Thr Leu Ala Gln Glu Phe Phe Arg Asp Val Glu Ala Gly Leu Asp  
 245 250 255  
 Pro Asp Val Pro Tyr Asn Tyr Phe Pro His Asn Asp Pro Gln Asn Thr  
 260 265 270  
 Pro Arg Ala Ser Trp Arg Ser His Gly Asn Leu Leu Phe Thr Asn Trp  
 275 280 285  
 Leu Asn Tyr Tyr Val Tyr Gln Ile Thr Pro Tyr Asp Leu Arg His Met  
 290 295 300  
 Asn Pro Thr Leu Asp  
 305

<210> 27

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: primer

<400> 27

ccagacgcac aagaagttgt c

<210> 28  
<211> 27  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:primer  
<400> 28  
tagatcgtat agcgtgctct ggtagac

27

<210> 29  
<211> 309  
<212> PRT  
<213> Escherichia coli

<400> 29  
Ala Met Leu Pro Val

5